REMARKS/ARGUMENTS

Claims 1-32 are under examination in the present application. The Office Action mailed on April 21, 2008, includes the following rejection:

1. Claims 1-32 are rejected under 35 U.S.C. § 112, written description requirement.
2. Claims 1-32 are rejected under 35 U.S.C. § 103.
3. Claims 1-32 are rejected under 35 U.S.C. § 103.

The amendment to the claims does not introduce new matter and is fully supported by the specification as filed. For example, see paragraph [0022].

Claims 1-32 are rejected under 35 U.S.C. § 112

The Action rejects claims 1-32 under 35 U.S.C. § 112 as not complying with the written description requirement. The Action states that there is no support for the term amorphous. The Applicant submits that the properties of the polymer are a function of the polymer and it is not necessary to define such in the specification as filed.

Applicant submits that the specification fully complies with the written description requirement, as the skilled artisan would readily know that given the physical parameters and characteristics of the polymers are amorphous polymers. Applicant submits that not everything necessary to practice the invention need be disclosed. In fact, what is well-known is best omitted. In re Buchner, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991). All that is necessary is that one skilled in the art be able to practice the claimed invention, given the level of knowledge and skill in the art. Further the scope of enablement must only bear a "reasonable correlation" to the scope of the claims. See, e.g., In re Fisher, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970).

The skilled artisan readily understands that the polymers presented in the instant specification are amorphous. For example, IUPAC provides general definitions of amorphous

polymers (e.g., structure with tangled chains and no long-range order) and crystalline polymer (e.g., polymer showing crystallinity). The skilled artisan readily understands thermoplastics are polymers where the molecules are held together by intermolecular forces so that the material softens when exposed to heat and retains their intermolecular interactions when cooled. The thermoplastics are generally separated into amorphous polymers, crystalline polymer and semi-crystalline polymer, each with separate and distinct characteristics.

> Amorphous polymers have amorphous regions made up of randomly coiled and entangled chains. Amorphous polymers are softer, have lower melting points, and are penetrated more by solvents than are their crystalline counterparts. Polymer chains with branches or irregular pendant groups cannot pack together regularly enough to form crystals. These polymers are said to be amorphous.
>
> Crystalline polymers are polymers that have crystallinity. Highly crystalline polymers are rigid, high melting, and less affected by solvent penetration. Crystallinity makes a polymers strong, but also lowers their impact resistance. As an example, samples of polyethylene prepared under high pressure have high crystallinities but are extremely brittle, (see Kaufman. S. H.; Falcetta, J. J. (Eds.) Introduction to Polymer Science and Technology, Wiley, NY: 1977, pp. 231 - 232.)
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> Semi-crystalline polymers have both crystalline and amorphous regions. Semi-crystalline polymers with crystals that are small and connected to the amorphous regions by polymer chains so there may be no sharp well-defined boundaries between the two types of regions. For some polymers, such as polyvinyl alcohol, there is a fairly distinct separation between the crystalline and amorphous regions, though. In other cases (e.g., HDPE) the structure basically is crystalline with uniformly-distributed flaws and imperfections, (see Kaufman. S. H.; Falcetta, J. J. (Eds.) Introduction to Polymer Science and Technology, Wiley, NY: 1977, pp. 13 - 23.) Semi-crystallinity is a combination of the strength of crystalline polymers with the flexibility of amorphous. Semi-crystalline polymers can be tough with an ability to bend without breaking

As a result, the skilled artisan can easily classify a polymer as amorphous, crystalline or semi-crystalline. Similarly, the polymers used in the present invention can be classified as amorphous, crystalline or semi-crystalline. Therefore, the use of the terms amorphous, crystalline or semi-crystalline are supported inherently in the specification as filed.

The Office Action states that although the specification states that the polymers comprise cationic groups, (paragraph 061), this is not the same as having a cationic charged or having cationic functional groups. Applicants respectively disagree and assert that the present invention includes cationic polymers, cationic groups and cationic pendent groups from the polymer. As stated in paragraph [0043-0044].

> Polymers are composed of cationic and anionic groups, present as part of the polymer backbone and as pendant structures attached to the backbone. Pendant ionic groups have much more ionic character and influence than do those in the

> backbone. Therefore, polymers having a high density of pendant cationic groups are preferred.

Therefore, it is clear that the present invention includes cationic polymers, cationic groups and cationic pendent groups from the polymer. Furthermore, the IUPAC Compendium of Chemical Terminology 2007 defines a cationic polymer as polymer having positive charged macromolecules, see below:

> cationic polymer is a polymer composed of positively charged macromolecules and an equivalent amount of counter-anions. Notes: 1) If a substantial fraction of constitutional units carries positive charges, then a cationic polymer is a polyelectrolyte. 2) The positive charges may be fixed on groups located in main chains as in an ionene or in pendant groups. 3) The term cationic polymer should not be used to denote a polymer prepared by cationic polymerization. 2006, *78*, 2069. IUPAC Compendium of Chemical Terminology 2007

Applicant submits that the specification fully complies with the written description requirement, as the skilled artisan would readily know that given the physical parameters and characteristics of the polymers are amorphous polymers.

As such, the use of cationic polymers is in compliance with the written description requirement is whether the disclosure of the application as originally filed reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter, rather than the presence or absence of literal support in the specification for the claim language. See *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-564, 19 USPQ2d 1111, 1116-117 (Fed. Cir. 1991) and *In re Kaslow*, 707 F.2d 1366, 1375, 217 USPQ 1089, 1096 (Fed. Cir. 1983). As such the skilled artisan would readily understand that the polymers were amorphous cationic polymers and thus complies with the written description requirement.

As such, the Applicants respectfully request withdrawal of the rejection of claims 1-32 under 35 U.S.C. § 112.

Claims 1-32 are rejected under 35 U.S.C. § 103(a)

The Office Action rejects claims 1-32 under 35 U.S.C. § 103(a) as being anticipated by United States Patent number 3,798,057 issued to Polovina, et al., ("Polovina") and in light of

Nishiguchi. Applicnats respectfully submit that Polovina fails to teach each and every limitation of the present invention. Specifically, Polovina teaches an epoxy. An epoxy is not an amorphous composition. By definition, an epoxy is not amorphous regardless of it containing bisphenol A or not.

Polovina alone or in combination fails to establish a prima facie case of obviousness. To establish a *prima facie* case of obviousness there must be: (1) some suggestion or motivation either in the reference itself, or within the knowledge generally available to one of ordinary skill in the art, to modify the reference; (2) a reasonable expectation of success, and (3) a teaching or suggestion in the prior art reference of all of the claim limitations (MPEP § 2143). In re Vacek, 947 F. 2d. 488 (Fed. Cir. 1991).

Specifically, Polovina alone or in combination fails to disclose the amorphous polymers of the present invention. The skilled artisan recognizes that polymers have specific morphologies as a function of the composition of the polymer. Generally, the polymers may be classified into crystalline polymers, semi-crystalline polymers and amorphous polymers among other classifications (epoxies, thermoplastics, thermosets, etc.). Applicants assert that the cited references disclose an amorphous cationic polymers, which by definition contain cationic groups.

Polovina (and the combination) discloses a THERMOSET and fails to teach an amorphous polymer. As seen below Polovina uses crosslinking agents specifically polyepoxy to form thermoset resins. The use of the cross-linking agents CROSS-LINK the polymers into a cross-linked epoxy. The properties of an epoxy are different from an amorphous polymer, for example, when heat is applied to a cross-linked epoxy it will decompose while an amorphous polymer (e.g., thermoplastic) will melt. Contrary to the assertion of the Office Action, Polovina and the combination does not teach a fibrous material impregnated with a compound having a continuous phase comprising one or more amorphous non-chlorinated cationic polymers, for inhibiting deposition of one or more dissolved or particulate contaminants in the water onto the medium, wherein the one or more amorphous non-chlorinated cationic polymers comprise at least one cationic group, wherein the continuous phase has an overall cationic charge. The combination discloses nothing more than a chlorinated resin, see Col. 1, lines 49-56 of Polovina:

> nated fibrous webs of the present invention are impregnated and coated with a mixture principally comprising a chlorinated hydrocarbon resin, a chlorinated additive thereto which functions as a plasticizer and/or film-forming agent, and a polyepoxy compound believed to function as a cross-linking agent imparting additional strength and rigidity to the resins and resin-coated fibrous webs. Also, the mixtures used for impregnation

Polovina (and the combination) simply does not disclose an amorphous non-chlorinated cationic polymer, wherein the continuous phase has an overall cationic charge. Polovina discloses a chlorinated resin. The present invention is not a chlorinated resin. To further this point Polovina provides of the chlorinated resin, e.g., Parlon, chlorinated polypropylene resins, chlorinated C3 and C5 polymeric hydrocarbons, Aroclor, Chlorowax (col. 2, ll. 54-64).

> Both the chlorinated terphenyls and the paraffin hydrocarbons are available commercially containing different amounts of chlorine. Those materials containing between about 40 percent and about 70 percent by weight of chlorine are particularly useful and include, for example, a chlorinated terphenyl available under the tradename "Aroclor 5460," which is a solid resin containing about 60 percent by weight of chlorine; "Chlorowax 70," a solid paraffin hydrocarbon chlorinated to an extent of 70 percent by weight; and "Chlorafin C-40," a liquid plasticizer containing from 40 to 42 percent of chlorine by weight.

The classic variety of epoxy resin is used as a thermoset polymer for adhesives and composites and manufactured through polymerization-polyaddition or polycondensation reactions. Epoxy resin are stronger than concrete, seamless and waterproof. As such, it has been mainly in use for industrial flooring purposes and includes epoxy and polyurethane used in interiors. As the chlorinated resin is a thermoset polymer composition it is not soluble and cannot have a nonpolar solubility parameter δn within the range of about 6.5 to about 8.5 g-cal/mole, it does not have a polar solubility parameter δp within the range of zero to about 8.5 g-cal/mole; and does not have a hydrogen bond solubility parameter δh within the range of zero to about 7.0 g- cal/mole. As a result the combination does not have a nonpolar solubility parameter δn within the range of about 6.5 to about 8.5 g-cal/mole, it does not have a a polar solubility parameter δp within the range of zero to about 8.5 g- cal/mole; and does not have a hydrogen bond solubility parameter δh within the range of zero to about 7.0 g- cal/mole.

In contrast to epoxies and thermosets, the present invention provides amorphous polymers with cationic substitutes, where the polymer chains are branches or irregular pendant groups that cannot pack together regularly enough to form crystals and are made up of a randomly coiled and entangled chains. Amorphous polymers are generally softer, have lower melting points and are penetrated more by solvents than are their crystalline counterparts. Thermoplastics have glass transition temperature, whereas thermos sets do not. Due to their random nature atactic polymers are usually amorphous. In contrast, semi-crystalline polymers have both crystalline and amorphous regions that combine the strength of crystalline polymers with the flexibility of amorphous. The crystals are small and connected to the amorphous regions by polymer chains so there may be no sharp well-defined boundaries between the two types of regions. Isotactic polymers are usually semicrystalline and often form a helix configuration. The skilled artisan readily recognizes that polyolefins and aliphatic polyesters are generally semi-crystalline polymers. Applicants assert that the skilled artisan can readily separate polymers into groups given the components, which make them up.

All of the references and combinations of references cited in the Office Action are epoxy compositions and NOT amorphous polymers. Polovina discloses CHLORONATED hydrocarbon resins not cationic amorphous polymers. Applicants claim a fibrous material impregnated with a compound having a continuous phase consisting essentially of one or more amorphous cationic polymers, for inhibiting deposition of one or more dissolved or particulate contaminants in the water onto the medium. IUPAC defines a cationic polymer as a polymer composed of positively charged macromolecules and an equivalent amount of counter-anions. IUPAC Compendium of Chemical Terminology 2007.

The present invention teaches a water/air contact medium for use in an evaporative cooler, having a fibrous material impregnated with a compound having a continuous phase. The continuous phase includes one or more amorphous non-chlorinated cationic polymers with an overall cationic charge, for inhibiting deposition of one or more dissolved or particulate contaminants in the water onto the medium. The continuous phase includes a nonpolar solubility parameter δn within the range of about 6.5 to about 8.5 g, a polar solubility parameter δp within the range of zero to about 8.5 g, and a hydrogen bond solubility parameter δh, within the range of

zero to about 7.0 g. In contrast, Polovina merely discloses a CHLORONATED hydrocarbon RESIN (see col. 1, ll. 48-59):

> used at pH's as low as 4 and as high as 13. The impregnated fibrous webs of the present invention are impregnated and coated with a mixture principally comprising a chlorinated hydrocarbon resin, a chlorinated additive thereto which functions as a plasticizer and/or film-forming agent, and a polyepoxy compound believed to function as a cross-linking agent imparting additional strength and rigidity to the resins and resin-coated fibrous webs. Also, the mixtures used for impregnation and coating may optionally contain pigments, particularly carbon black, and mineral fillers such as clays or powdered silica.

Polovina discloses the need for the polymer to be chlorinated, (see col. 2, ll. 38-44):

> In the alternative, chlorinated polypropylene resins may be employed. These materials are also available commercially, for example under the name "Parlon," and are available with the same degree of chlorination (about 65 percent) and in the same variety of grades depending on molecular weight, as are the chlorinated rubbers.

The chlorinated polymers of Polovina have chlorine atoms that are in a pendant substituent position on the polymer backbone and create a polymer with a chlorine functional group that provides unshared electron pairs lateral on the surface of the polymer backbone. This greatly affects the surface properties of the polymer, in such a way that is contrary to the non-chlorinated cationic polymers of present invention. Polovina also includes other chlorinated compounds, (see col. 2, ll. 45-53).

> It is desirable, according to the present invention, to combine a material functioning as a plasticizer and/or film-forming agent with these chlorinated C_4 and C_5 polymeric hydrocarbons. Particularly suitable plasticizers and/or film-forming agents include chlorinated terphenyls, such as those commercially available under the tradename "Aroclor," and chlorinated paraffins, i.e., chlorinated higher aliphatic hydrocarbons having 20 – 30 carbon atoms.

Polovina does disclose the use of polyepoxies (see col. 3, ll. 10-10).

> exact role of the polyepoxy compound in the claimed compositions is not known. However, because of its poly-functionality, it is believed it may act in the present compositions as a cross-linking agent. The polyepoxy compounds are glycidyl ethers of phenols, specifically diglycidyl or polyglycidyl ethers of bisphenols such as bisphenol A and bisphenol F. Diglycidyl ethers

However, the polyepoxies function as cross-linking agents imparting additional strength and rigidity to the **chlorinated** hydrocarbon **resins** and **chlorinated** hydrocarbon **resins**-coated fibrous webs. Therefore, at the very most, Polovina discloses a chlorinated hydrocarbon resin and a poly-epoxy cross-linking agent.

The present invention is non-chlorinated and has an overall cationic charge and a DIFFERENT chemical structure and function than the chlorinated hydrocarbon resins of Polovina. As the chemical structures are different the composition must also be different. Polovina is NOT identical to the present invention and CANNOT anticipate (or render obvious) the present invention.

In addition, Polovina only discloses chlorinated polymers. "Suitable chlorinated rubbers are commercially available under the tradename "Parlon" " (Polovina, col. 2, ll. 19-20). As the skilled artisan knows chlorinated polymers (e.g., Parlon) are **semi-crystalline** polymers in structure and are therefore different in structure than the present invention and cannot identically disclose the claimed invention. Polovina in no way enable one skilled in the art to make the one or more amorphous non-chlorinated cationic polymers with an overall cationic charge of the present invention. Applicants are willing to submit a declaration to that fact if the Examiner deems it necessary.

To anticipate a claim, "a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter." *PPG Industries, Inc. v. Guardian Industries Corp.*, 75 F.3d 1558, 1566, 37 U.S.P.Q.2d 1618, 1624 (Fed. Cir. 1996). As stated by the Courts in *Akzo N.V. v. ITC*, 1 U.S.P.Q.2d 1241, 1245 (Fed. Cir. 1986) and *Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773, 778 (Fed. Cir. 1985), the anticipating prior art reference "must enable one skilled in the art to practice the claimed invention, thus placing the allegedly disclosed matter in the possession of the public."

Specifically, Polovina teaches chlorinated semi-crystalline polymers (e.g., chlorinated

polypropylene and polyisoprene, that are chlorinated polymer of C_3 monomers or polymer of a C_5 monomer) and does not teach **non-chlorinated cationic amorphous polymers** that have an overall cationic charge. In addition, the polymers of Polovina do not have a nonpolar solubility parameter δ_n within the range of about 6.5 to about 8.5 g, a polar solubility parameter δ_p within the range of zero to about 8.5 g, and a hydrogen bond solubility parameter δ_h, within the range of zero to about 7.0 g. Therefore, Polovina simply does not teach the present invention. To anticipate a claim, a reference must teach every element of the claim either impliedly or explicitly. See MPEP §2131. As elaborated in *Richardson v. Suzuki Motor Co.*, "[t]he **identical invention must be shown** in as complete detail as is contained in the claim." 9 U.S.P.Q.2d 1913, 1920(Fed. Cir. 1987) emphasis added. One skilled in the art would not be unable to practice the present invention without the teachings of the present application and as such Polovina cannot anticipate or render obvious the present invention.

Applicants respectfully request withdrawal of the rejection under 35 U.S.C. § 102 and in the alternative the rejection under 35 U.S.C. § 103.

Conclusion

In light of the remarks and arguments presented above, Applicants respectfully submit that the claims 1-32 are in the Application are in condition for allowance.

If the Examiner has any questions or comments, or if further clarification is required, it is requested that the Examiner contact the undersigned at the telephone number listed below.

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Respectfully submitted,

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